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ABSTRACT

The epidemiological approach, as elaborated to accomodate multiple-causation of chronic disease, is suggested as appropriate for the size and the nature of the failure-to-learn problem faced by educators. The epidemiological approach begins with an examination of the health status of an area's population. Major problems are identified with respect to location, geography, age, race, sex, income status, educational level and other variables. The next step is to seek out services and programs likely to be most efficacious in remediating the problems of high risk groups. Finally, follow-up research to measure the effectiveness of interventions is planned and implemented. (Author/RH)

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# Epidemiology for Educators

Paper presented at the Annual Meeting of the
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The rapid spread of competency tests for pupils in secondary schools across the nation is testimony to widespread fear that many young people throughout the country are about to leave high school unable to read and compute sufficiently well to manage the everyday tasks of life in a literate, numerate world. This, despite the ten or eleven years they have spent in the institutions provided for them to learn those very skills and, we all thought, much, much more.

No one has seriously suggested that the general level of intelligence of children is declining. Nor has our country ever spent as much money on the operation of its schools as it is now doing.

It makes sense to state, therefore, that our country has "learning problems" on a population-wide basis, just as we already recognize that we have population-wide health problems. Failure-to-learn is even felt by some to have reached epidemic proportions.

The purpose of this paper is to suggest that as educators interested in overcoming learning problems, we consider taking a leaf from the book of health planners whose job it is to direct efforts to overcome health problems, especially by finding where and how to use "the ounce of prevention."

Let us take a quick look at what health planners do. They begin their job with the help of epidemiology, often referred to as a "population-based" science. The Greek work "demo" -- "people" -- is in fact at the very center of the word, epi-demi-ology. Data which describe the health -- at least, the illness -- of populations are in the form of mortality rates for

various causes of death, as well as much less complete information for morbidity (illness) rates, usually recorded for communicable diseases. National rates for these are available, as well as rates for regions, states and localities, so that comparisons can be made. Census information is drawn upon. Thus, the planners identify the major health problems of the area they are addressing, and are able to identify the prevalence of the problems in particular sub-groups of the population, typically broken down by geographic area, age, sex, income level, rural-urban location, and the like. The identification of the population groups experiencing (or likely to experience) high rates of a given problem makes it relatively easy to target their major efforts: first of all, to prevent, if possible, then to provide interventions where they will reach most effectively the sub-populations where the diesase occurs most frequently and/or seriously. It is then a matter of knowing what interventions "work" -- are efficacious -- for those problems in their particular population. Here again, the methods of epidemiology are useful in determining "causes and cures." An excellent presentation of this function is to be found in the article by David Mechanic, "The Use of Epidemiologic Methods as a Means for Advancing the Quality of Health Care."[1]

"Causes," or contributing causes, are sometimes indicated by differences in the patterns found for incidence or prevalence. To locate these patterns may be regarded as a first order of business of epidemiologists, and the beginning assumption of the science is that "disease does not occur at random

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[1] In, Proceedings: Conference on Professional Self Regulation, DHEW Publ. No. (HRA) 77-621.

in populations."[2] The research question applied to any health problem is, therefore, a combination of these: "Where is the disorder located?" "Who in the population has it?" "When does it occur?" The resulting prevalence rates are the starting point. Locations of areas and populations and periods where these rates are low of course are as informative as knowing where they are high: thus was the relationship between fluoride and dental caries established on the basis of especially few dental problems in a few areas.

It is thus that risk factors for the disorders are located, and populations at risk for the disorder identified. An important aspect of pinpointing identifiable high-risk populations is that of prevention. Not only do incidence rates lead to finding fully developed cases, but theoretically, the same populations contain most of the incipient cases of the disorder as well, and finding them makes possible early intervention to prevent their reaching more serious stages. When causative factors are actually established, there exists the possibility of preventing many cases from occuring at all by primary prevention programs. Addition of correct amounts of fluoride to water supplies to prevent much tooth decay from ever occurring is an example of such a measure.

Several parallels exist between the present-day conditions of medicine and education and the problems they face. This writer proposes that they have moved toward this condition of similarity from starting points which were far apart from each other.

The medical profession and institutions have in the past been directed singlemindedly toward incidents of illness, usually acute illness and injury, and seldom has there been time or similar expertise for dealing with the

[2]Refer to the following for concise descriptions of epidemiology:
Friedman, G. (1974) Primer of Epidemiology, New York: McGraw Hill Co.
Lilienfeld, G. (1978) Defin. of Epidem. Am. J. of Epidemiology 107: 87-90.

problem of maintaining wellness, or of helping people cope with the non-acute but long-term problems of chronic diseases. The profession addressed itself almost entirely to the "illness" point on the wellness-illness continuum. The very success at handling and preventing acute illnesses has helped change all of that. It is now more and more frequently chronic diseases for which a growing number of people need care and help, and far-sighted people seek to prevent illnesses and maintain good health as long as they can. In response, the medical profession is moving its focus and activities toward the "wellness" point. The Health Maintenance Organization is a newcomer on the scene as a place to find physicians practicing.

Educators, for their part, have long proceeded on the firm assumption that pupils learned what was taught in school -- excepting for rare cases where there was something unusual about the pupil, some handicapping condition. The job, as educators, was something entirely different from treating illness or disorder, and wellness of virtually all pupils was assumed. When failures did occur, there was the option of having them repeat the material they didn't learn the first time through, but in times past that occurred for only a small proportion of the total. Many children in fact dropped out along the way, but not a great deal of attention was directed toward that on the part of educators. Until very recently, those in the mainstream of education regarded their job as one of teaching more and more to those who were learning the material they were there to teach. Those pupils who weren't there, or weren't learning, were not their proper concern, but were to be taken over by other professions.

It has become increasingly apparent to everyone, however, that a very large proportion of pupils are failing to learn in their years at school.

It is suggested here that we can conceptualize this as a high prevalence of chronic disorder in the functioning of the learning process. More and more children need help with this chronic problem, and most of us recognize that widespread failure to learn is a condition calling for preventive measures.

Thus, the problems of both education and medicine appear now to be population problems, no longer just individual problems. Both professions are faced with large numbers of people with chronic problems along a continuum somewhere between "illness" and "wellness."

The methods of epidemiology have managed to evolve and keep pace with the nature of the changing medical problems.[3] There was a day when the most frequent illnesses could be mastered by seeking and finding a single cause and a corresponding cure: the germ theory was relatively simple and appropriate. Today's chronic problems -- hypertension, heart disease, e.g. -- are recognized as having multiple causes. Epidemiology's approach and research methods have broadened and changed to accommodate the new phenomena. For many of these it has become necessary to conceptualize as the cause a number of behaviors, grouped together under the concept "lifestyle."

Lately, with questions raised increasingly regarding effectiveness and efficaciousness of programs and delivery systems, these methods have been applied to evaluate outcomes.[4]

The approach of educators has not kept pace with the growing size of the "failure to learn" problem. It is still frequently conceptualized as

[3]See Omran, A.R. (1969). Epidemiologic aspects of health and population dynamics. Bulletin of the Gandhigram Institute, Part II.

[4]An example of a sophisticated study of outcome is the Institute of Medicine's study report in Assessment of Medical Care for Children, Washington, D.C.: National Academy of Sciences, 1974.

an instance of failure on the part of someone -- child, parents, or teacher -- or something, like a reading method or "the new Math." This, we propose, is like continuing to approaching the different illnesses of today with "the germ theory." It is not an adequate approach for a chronic problem resulting from multiple causes which has come to be widespread in a population. The epidemiological approach, as elaborated to accommodate multiple-causation of chronic disease, is suggested as appropriate for the size and the nature of the failure-to-learn problem faced by educators.

Bits and pieces of efforts congruent with the population-based approach have appeared in the last fifteen years. Head Start and Compensatory Education (Title I of ESEA) are efforts directed at populations at risk for having problems in school. On the whole, however, these programs have met with less success than might have been the case had there been an adequate conceptualization of failure-to-learn as a population problem on the basis of which such programs were designed and put into place as a part of a data-based strategy.

As a model providing such a conceptualization as a basis, the approach of health planners to the improvement of health is worthy of consideration by educators. As described above, that approach begins with an examination of the health status of an area's population. This is a process of identifying major problems which exist and their location, by geography, age, race, sex, income status, educational level and the like. The next step is to seek out those services and programs likely to be most efficacious for those problems in the high-risk groups. Finally, there is planning for and implementation of follow-up research to measure outcome of the effectiveness with which the high-risk groups were reached, and the actual efficaciousness of the services in bringing about a decrease in the prevalence of the problems.

Epidemiological methods of research are appropriate for all of those steps and that is the reason for recommending them to educational researchers.

It may not be a large step to make from where we now stand. Some of the framework for educational planning by regions is similar to that of health planning. In North Carolina there are educational districts approximately the same size in area and population as the State's six HSA's. There is surely as great an urgency in education as in health to distribute scarce resources on a rational basis if there is to be a realization of the goals felt important by the people of each area.

Finally, it is time for educators to shift their gaze "up stream" as did the physician reported upon in a recent article:[5]

> My friend, Irving Zola, relates the story of a physician trying to explain the dilemmas of the modern practice of medicine.
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> "You know", he said, "sometimes it feels like this. There I am standing by the shore of a swiftly flowing river and I hear the cry of a drowning man. So I jump into the river, put my arms around him, pull him to shore and apply artificial respiration. Just when he begins to breathe, there is another cry for help. So I jump into the river, reach him, pull him to shore, apply artificial respiration, and then just as he begins to breathe, another cry for help. So back in the river again, reaching, pulling, applying, breathing and then another yell. Again and again, without end, goes the sequence. You know, I am so busy jumping in, pulling them to shore, applying artificial respiration, that I have *no* time to see who the hell is upstream pushing them all in"!
>
> I believe this simple story illustrates two important points. *First*, it highlights the fact that a clear majority of our resources and activities in the health field are devoted to what I term "downstream" endeavors – in the form of superficial, categorical tinkering in response to almost perennial shifts from one health issue to the next, without really solving anything. I am, of course, not suggesting that such efforts are entirely futile, or that a considerable amount of short-term good is not being accomplished. Clearly, people and groups have important immediate needs which must be recognized and attended to. Nevertheless, one must be wary of the *short-term nature* and *ultimate futility* of such downstream endeavors.
>
> *Second*, the story indicates that we should somehow cease our preoccupation with this short-term, problem-specific tinkering and begin focussing our attention upstream, where the real problems lie. . . .

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[5]John B. McKinlay, "A case for refocusing upstream -- the political economy of illness." in Behavioral Science Research Data Review, p. 7.